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Pigs, people, pathogens: A qualitative analysis of the pig value chain in the central region of Uganda

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Pigs, people, pathogens: A qualitative analysis of the pig value chain in the central region of Uganda

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Abbreviations and acronyms

AIDS	Acquired Immune Deficiency Syndrome
ASF	African swine fever
HIV	Human Immunodeficiency Virus
ILRI	International Livestock Research Institute
KCCA	Kampala Capital City Authority
UBOS	Uganda Bureau of Statistics
UGX	Uganda shillings

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Key messages

- African swine fever (ASF) is perceived to be the most urgent challenge for pig farmers in the central region of Uganda.
- Farmers deworm pigs using incorrect drugs and/or incorrect dosages.
- Pork is considered by butchers to be a 'clean' meat and not a potential source of disease.
- Unregulated, informal slaughterhouses supply the majority of butchers in Kampala.
- There are currently limited diagnostics for *Taenia solium* in both pigs and humans.

Introduction

The following report provides a summary of research conducted in the peri-urban to urban pig value chain between Mukono District and Kampala in Uganda's central region. Its main focus is the zoonotic parasite *Taenia solium,* also referred to as the pork tapeworm, and cysticercosis, an infection with the larvae of *T. solium*. The report highlights perceptions of *T. solium* and other pathogens associated with pigs as articulated by farmers, butchers, slaughterhouse workers, pork consumers and medical professionals.

There has been an increased emphasis on One Health, especially after the 2004 outbreak of avian influenza (Gibbs 2014). In theory, this has generated greater collaboration among human, animal and environmental sciences. However, it has also been argued that despite creating a renewed focus on the benefits of interdisciplinary research, social science is still not recognized as central to the One Health agenda (Lapinski et al. 2015). This research will, therefore, contribute towards a greater understanding of One Health from a largely overlooked social science perspective.

Methods

The research was conducted between January and December 2016. Participant observation and semi-structured interviews were the main methods used throughout the study. All interviews were conducted in either English or Luganda. Although the author had attended intensive Luganda classes, a research assistant simultaneously translated interviews conducted in Luganda into English.

The research questions were:

- How do different actors respond to pig diseases along Uganda's pig value chain?
- Why do pig diseases matter and to whom?
- What does 'hygiene' mean to butchers in Uganda's central region?
- Why is pork becoming an increasingly popular meat in Uganda?
- Should informal slaughterhouses be recognized as legitimate suppliers of pork?
- What diagnostics are there for cysticercosis and are they being successfully utilized?

The months of February to April 2016 were spent with farmers observing their farming practices. This involved recognizing how different diseases were thought to be present in pigs, humans and the environment. Over the course of the research, interviews were conducted with 30 farmers (15 male and 15 female), the Mukono District Veterinary Officer and three government contracted veterinarians. Two community-based animal health workers—often referred to as 'local vets'—were interviewed and their practices observed, and a week was spent with three separate farmers observing their day-to-day pig farming practices and deworming techniques.

The following three months were spent with butchers observing meat preservation techniques, butchering processes, hygiene and sanitation practices and fly reduction methods. A total of 30 butchers were interviewed: 20 in Kampala and 10 in Mukono District. One-week observations were conducted with the only two female butchers identified in Kampala and with one male butcher in Mukono.

The period between August and October 2016 was spent observing the government recognized Wambizzi slaughtering facility and five other informal slaughtering sites in Kampala. In these locations, slaughterhouse workers, meat inspectors and managers were interviewed and hygiene, disease recognition, slaughtering techniques and trading of pigs and carcasses were observed and discussed.

The final two months of the study period were spent in multiple hospitals, clinics and laboratories interviewing doctors and laboratory technicians on human deworming practices and diagnostics for neurocysticercosis.

Single interviews were also conducted with staff at the Kampala Capital City Authority (KCCA), staff at the International Livestock Research Institute (ILRI), principal veterinary officers from the Ministry of Agriculture and laboratory technicians at Astel Diagnostics.

Results

Farms

The majority of research conducted on farms was in Mukono District (Figure 1) and covered the sub-counties of Goma, Kyampisi, Nama, Ntenjeru and Mukono Central. Within these sub-counties, extended periods of time were spent on four separate farms in the towns of Nama, Katosi and Nagalama and on an urban farm in Kansanga, Kampala.

Figure 1: Administrative map of Mukono District.

Source: UBOS (2009)

Mukono was chosen because of its proximity to Kampala in the peri-urban to urban pig value chain. Moreover, in the 2008 national livestock census report, the central region, which encompasses Mukono, had the highest number of live pigs at an estimate of 1.3 million (UBOS 2008).

Data from farms highlight the following:

- The majority of farmers use a free-range/scavenging system, especially if they own less than five pigs.

- Pig-keeping is not considered to be a time-consuming activity, with an average of 30 minutes to one hour invested in pig production per day.

- Feeds and diseases, specifically ASF, are the most cited constraints for pig farmers.

African swine fever

Among all farmers interviewed, the threat of ASF was the biggest challenge they faced in pig production. All farmers reported that they had lost pigs from the disease at some point in time. All farmers referred to ASF in Luganda as 'omusujja' (fever) and in English as swine flu or swine fever. Farmers associated the following symptoms with ASF: reddening of the skin, particularly the ears and stomach; shaking; loss of appetite and inability to move.

ASF was predominately thought to come from the environment (soil, wind and/or feeds) but local beliefs around poisoning and witchcraft were also said to be a possible cause of the rapid death of pigs, accompanied by haemorrhage. With no current treatment, farmers considered a vaccine for ASF to be urgent and many said they would pay for it if it came to fruition.

Livelihoods

Interviews with both male and female farmers established that money generated from pig farming was almost always used for paying school fees and medical bills or maintaining the household. This is also why ASF is considered to be so devastating, as it seriously affects plans for the future. Accordingly, when pigs show any signs of ASF, farmers attempt to immediately sell the infected pigs to traders at a reduced distress price.

Moreover, it was observed that when several farmers lost their pigs, they restocked straight away without changing any of their farming practices. This was despite being told by veterinarians that, for biosecurity reasons, they should wait for six months before restocking. This need to restock was attributed to the inevitability of ASF in pig farming and that there is a constant high demand for pork in Uganda. This suggests that money can still be made selling ASF-infected pigs at a distress price as opposed to not rearing and selling pigs at all.

Feeds

Feeds and their cost is a regular discussion point on the farms. Pigs are fed a diet consisting of any of the following: cassava, potato vines, sweet potatoes, maize bran and small fish. Farmers also regularly include household and hotel waste food (Figure 2), anthill soil for iron and salt to make the pig thirsty.

When piglets are sty-reared in the same pen as mature pigs, farmers are concerned that the piglets will not be able to access enough food. This accounts for an increased number of free-roaming piglets observed across all the farms. Therefore, limited access to feeds not only affects the nutrition of pigs but also exposes them to disease. However, none of the farmers interviewed linked free-roaming pigs to *T. solium* or, specifically, the parasite's metacestode stage: cysticercosis. Cysts in pigs were not reported across any of the farms.

Farmers also claimed that they were more likely to let all their pigs roam freely during the dry season when they can no longer gather an adequate amount of food. This negates biosecurity measures, as free-roaming pigs are exposed to viruses and faeces. The link between free-roaming, feeds and infection became explicitly clear when discussing seasonal patterns of disease, as the majority of farmers identified the dry months, when feeds were scarce, to be the most dangerous for transmission of ASF.

Figure 2: Urban pig feeds; hotel waste containing plastic cups and glass shards.

Photo credit: Rebekah Thompson

Deworming

Aside from hosting *T. solium*, pigs harbour the parasite *Ascaris suum*, which has also been documented as zoonotic (Nejsum et al. 2005), although the significance of this is not settled. Nevertheless, interviews with farmers suggest that individuals are deworming their animals more than themselves and their families; reasons for this include the comparative cost of deworming animals, accessibility to treatments and the notion that only children or drunkards are susceptible to helminth infections. Moreover, dewormed pigs grow to a healthier weight and, therefore, sell at a higher price.

Veterinarians, most often 'local vets', are considered to be central to deworming practices. This is in conjunction with veterinary shops, which are another vital source of farmers' knowledge on deworming. Very few farmers paid for government vets to come and administer drugs. As a government-contracted vet based in Mukono observed, 'The farmer has to pay for the vet's time, fuel and for the drugs required' (field notes 20 March 2015). Thus, if the farmer owns less than five pigs then these costs work out as prohibitively expensive.

Without veterinary guidance, many farmers are deworming pigs ineffectually. For example, farmers were observed administering incorrect dosages of ivermectin based on wrong estimates of live weights. Aside from impacting on medication dosages, not knowing a pig's live weight means that farmers could potentially undersell their pigs to traders. No farmers used weighing bands or knew that weights can be calculated aside from visual estimations.

A small number of farmers also used incorrect drugs for deworming such as antibiotics or multivitamin solutions. Local treatments— ranging from teas made from *Aloe vera* or papaya seeds to adding dried marijuana to feeds—were also regularly used for deworming.

Finally, regardless of whether worms were visibly present or not, pig manure was generally perceived to be a safe product. All the farmers claimed to use pig manure straight from the pigsty to their farms as pig manure was thought to be effective after three days. This contrasts with cattle manure, which is thought to take up to six months before it is ready for application on crops.

Butcheries and pork joints

Butcheries were located in the same locations as farms in Mukono and throughout all five divisions of Kampala. Throughout Mukono and Kampala, pork is sold from premises known as 'pork joints'. These spaces are separate from other meat butcheries (chicken, goat and beef) and usually hang their pork in the window for customers to see (Figure 3). Butchers in pork joints referred to pork as 'soft', 'delicious' and 'healthy' with some proclaiming it Uganda's favourite meat.

Customers can buy fresh pork at prices ranging from 9000 to 10,000 Uganda shillings (UGX) per kilogram. Roasted pork on sticks is sold at UGX 2500–3500 and a kilogram of fried pork with added plantain and cabbage is sold at UGX 11,000–13,000. All butchers sold more meat on Fridays, Saturdays and Sundays, with most selling 50–90 kg of meat a day. On weekdays, butchers sold 30–50 kg of meat a day. Leftover meat was very uncommon.

Figure 3: A pork butcher in Mukono Central.

Photo credit: Rebekah Thompson

Data from butchers highlight the following:

- Practices around pork handling differ between Kampala and Mukono. This is because there are meat laws specifically for Kampala.
- In most pork joints, pork meat and fat is commonly seen as vital in reducing the symptoms of Human Immunodeficiency Virus (HIV) and slowing the progression of HIV into Acquired Immune Deficiency Syndrome (AIDS).
- Pork is generally not considered to be a potential source of disease, which allows for the consumption of undercooked pork.

Preservation

When asked where along the value chain pigs are infected with diseases, all butchers claimed that pigs could only fall sick on farms. Once pigs have been slaughtered, there is thought to be no risk of subsequent infection. This was attributed to the perception that once the animal is dead, it is impossible for it to be infected or infectious. Leaving meat out for up to four days is, therefore, not seen as a problem as long as some form of preservation is used, such as covering the meat in salt or smoking it under a fire. When butchers were asked if they knew when meat is no longer edible, all claimed that the colour and smell of the meat changes. The majority of butchers believed that bad meat turns a bright red colour.

Roughly half of the butchers in Kampala used refrigerators; however, in Mukono, no butchers had regular access to a refrigerator. Instead, butchers hung the meat from the ceiling or directly outside the building. This practice exposes the pork to animals such as dogs, which were regularly seen licking carcasses.

Worms

Most butchers and pork joint customers were unsure about which worms infect humans and/or pigs. Some claimed that pigs do not have worms while others claimed that there are worms but that pig worms and human worms are quite different.

A clear difference in identifying worms is in the local terminology between species. 'Njoka' is a generic term meaning worms of all kinds including garden worms, whereas the specific term 'enfaana' is used for a tapeworm. Enfaana is conceptualized as something distinct from njoka. Enfaana is considered to be longer and more powerful than other worms. Most importantly, enfaana is not considered by butchers to come from pork but instead dirty environments, raw vegetables and sweet potatoes.

Flies

In general, flies are not thought to be a significant threat to hygiene in butcheries. Most butchers believe that through creating enough smoke and regularly cleaning, flies will not spread diseases. When asked whether flies are dangerous, some butchers claimed that only 'blue' flies are problematic or it is only in extremely dirty places that flies can spread diseases such as diarrhoea.

While butchers in Kampala are regulated to protect meat through installing glass windows, the use of fly nets has been unsuccessful. None of the butchers used fly nets. There were various reasons for this, including perceptions that flies are not a problem, flies on meat are inevitable, and fly nets obscured the view of the meat, needed regular washing or developed holes that were hard to repair.

Alcohol

Many butchers and customers claimed that drinking alcohol could kill the worms inside the stomach or literally 'make the worms drunk' (field notes 14 June 2015). This could explain why alcohol is very common in pork joints, especially strong liquor such as Waragi (Ugandan gin). Alcohol is also thought to cut down the fat of the meat. This has two perceived benefits. First, consumers do not think they will gain weight if they drink spirits while eating large quantities of pork. Second, they can drink more alcohol over the course of the night without getting drunk because the fat absorbs the alcohol allowing for continual drinking.

Because pork fat is thought to absorb the alcohol, some customers prefer their pork to be undercooked. This is because when pork is fully cooked, the fat drips off and therefore will not fully 'neutralize' the alcohol. This undercooked pork exposes customers to multiple potential zoonotic pathogens including *T. solium.*

HIV

A major factor in the rise of pork consumption is its perceived ability to reduce the effects of and/or treat HIV. This theme was also apparent on the farms but became extremely clear during research in pork joints and butcheries. This link between pork and HIV is so engrained that doctors in Mulago Referral Hospital claim that pork joints are being named 'TASO' after the main HIV/AIDS support organization in Kampala.

Individuals cited multiple reasons as to how pork reduces the effects of HIV. Some customers claimed that pork is like a soldier that fights against the infection and gives the white blood cells power inside the body. Others claimed that pork causes the virus to sleep or become weak. Some believed that the pork fat clogged the virus, making it unable to 'swim', while others claimed that the virus was attracted to the pork fat before the human body.

Pork is, therefore, increasingly being seen as a complementary treatment for HIV infection, alongside antiretroviral drugs. However, most informants claimed that HIV-positive individuals continue to take antiretroviral drugs in conjunction with consuming pork, with the drugs still considered essential to staying alive.

Slaughterhouses and slaughtering practices

Slaughterhouses are where interventions around cysticercosis are most likely to occur. Wambizzi is the only slaughterhouse in Uganda that is formally registered and recognized by the government. However, upon asking butchers where they purchased their meat, five additional informal slaughterhouses around Kampala were identified.

Data from slaughterhouses highlight the following:

- Most butchers choose to buy pork from informal slaughterhouses not Wambizzi.
- Pigs with symptoms of ASF are sold at distress prices and therefore traders are moving sick animals between Mukono and Kampala.
- Informal slaughterhouses use a blue stamp that mimics the meat inspector's stamp used in Wambizzi.

Wambizzi slaughterhouse

In Wambizzi, slaughtering takes place daily between 0530 and 0900 hours. Approximately 50 people work on site and 60–80 pigs are slaughtered every day. Women do not slaughter pigs but work directly outside the slaughterhouse as meat vendors. Two meat inspectors are permanently employed and are present from approximately 0600 hours onwards.

As Wambizzi is the only formally recognized slaughterhouse in Kampala, it is where most interventions and sampling takes place. Because of this, some workers asked why 'white people' were always conducting research there. Further trust issues were also raised as researchers were connected with condemning meat and hindering businesses. Managers and meat inspectors at Wambizzi also regularly commented that research was not being adequately explained and reported back to the slaughterhouse staff.

Animal welfare is not considered, with pigs kicked, dragged and exposed to slaughtered carcasses. Pregnant pigs are also regularly slaughtered. There is no formal training of slaughterhouse staff, with many claiming to have learnt on the job.

There is no disinfection or biosecurity measures amongst the traders or workers. It was observed that meat inspectors pass meat with ASF as low-grade meat. This means that the disease is easily spread to traders who transfer it back to farms. Moreover, if meat inspectors condemn meat then traders will not buy pigs from those farms again. This means that while cysts may not be regularly observed in meat at Wambizzi, they are still present in meat supplied from informal slaughterhouses and from backyard slaughters.

Alcohol consumption is also extremely high with the majority of slaughterhouse workers drinking at some point during the morning. Reasons given as to why they drink alcohol on the job include: early hours, the cold, to forget what they are seeing and that pork and alcohol go well together. Many of the workers drink Waragi in sachets or small plastic bottles.

Cysticercosis

Outside of Wambizzi, all butchers and individuals slaughtering pigs claimed to have seen pork with cysts. In Katosi, a fishing village along the edge of Lake Victoria, one butcher claimed to have seen cysts in meat at least every month. No butchers or slaughterhouse workers linked the cysts to *T. solium* and no link was made between free-roaming pigs and cysts. The cause of cysts is thought to be either injury or injections of medication prior to slaughter. These cysts are commonly referred to as 'mchele' (rice). Under most circumstances, cysts are not consumed but are cut off and the rest of the pork sold. However, in some informal slaughtering facilities, meat infected with cysts is cut off, roasted over an open fire and eaten by the workers.

Informal slaughterhouses

Informal slaughtering facilities are scattered throughout Kampala and the surrounding districts of Wakiso and Mukono. Informal slaughterhouses supply the majority of meat in Kampala. Out of the five visited, three were slaughtering between 25 and 30 pigs a day while two were slaughtering between five and 10 pigs a day. These slaughterhouses are illegal and KCCA is constantly trying to shut them down. However, most owners claim to bribe KCCA or if the premises are closed, relocate and start supplying once again.

The slaughtering areas are often in urban backyards. Live pigs are kept inside slaughtering pens. There is no effective waste management, with blood and intestines washed in open streams. These streams lead into the surrounding houses, where children are seen playing. All informal slaughtering facilities have many dogs, which lick cutting boards and carcasses. Off-cuts of meat are cooked over open flames and the slaughterhouse workers eat raw and half-cooked fats. This is where multiple carcasses with visible cysts in the meat were observed.

Disease management in informal slaughterhouses is virtually non-existent with no meat inspectors present. ASF is rampant, with the most severely infected pigs often sold at distress prices to informal slaughterhouse traders. If the pig is infected with ASF, the skin is removed from the meat after slaughter and then supplied with disease-free meat to disguise the difference in colour. All informal slaughterhouses have produced a blue stamp that mimics the one used by meat inspectors at Wambizzi. These slaughterhouses may not be legal but it is essential that they are recognized in order to reduce disease transmission and improve food safety.

Backyard slaughtering

Over the research period, multiple informal slaughters were observed in Kyampisi, Goma, Katosi and Namugongo. In Mukono, all slaughtering is informal as, unlike for beef, there is no centralized slaughter slab. In Mukono, butchers find pigs on farms and slaughter them daily for consumption; this means that slaughtering is usually over plastic bags or banana leaves (Figure 4). One slaughter was conducted over a toilet because as the butcher remarked, 'that is where dirty things are meant to go' (field notes 3 June2015). During the slaughter, children and animals are usually present. Meat inspection in Mukono is extremely limited and is confined to meat already being sold in butcheries.

Figure 4: Backyard slaughter on banana leaves in Namugongo.

Photo credit: Rebekah Thompson

Diagnostics

Pigs

There is a strong belief amongst Wambizzi slaughterhouse workers that cysts, which cause human illness, are only found in pigs from northern districts such as Gulu, Lira and Soroti. Many traders do not buy pigs from such regions and therefore do not consider cysticercosis to be a risk.

Diagnostics for pigs have been developed by ILRI. An interview with a laboratory technician from Astel Diagnostics highlighted that small numbers of tests have been carried out and that ILRI plans to trial them at Wambizzi slaughterhouse. However, this research suggests that Wambizzi should not be the only location in which the diagnostic is tested, as this site alone will give a limited result.

Human cysticercosis

Currently, computerized tomography scans are the only method by which to diagnose cysticercosis in humans and, in particular, neurocysticercosis, which affects the brain. This technology is expensive and difficult to access and therefore all doctors in Kampala admit to never testing patients specifically for neurocysticercosis. Instead, without adequate diagnostics, doctors claim that cysts in human brains will only ever be discovered post mortem.

A common symptom of neurocysticercosis is adult-acquired epilepsy. However, on farms, epileptic seizures are often connected to malaria, the new moon, bad spirits or historical family disputes. In hospitals, seizures are often considered to be a mental health problem as opposed to a neurological one. This suggests that even if patients infected with *T. solium* are referred to hospital, they would not be adequately tested or diagnosed.

Human worms

Types of worms are not distinguished microscopically and therefore treatment is not being administered appropriately. Stool samples are expensive and worms are considered as a normal infection that is usually limited to children. This is problematic, as even if individuals are deworming, a patient suffering from a tapeworm infection requires a higher dose of albendazole or another drug such as praziquantel (Chai 2013). If the tapeworm infection is left untreated, then pigs exposed to human faeces containing the eggs of the tapeworm could perpetuate the *T. solium* life cycle.

This research suggests that the true extent of *T. solium* infection in Uganda's central region is almost impossible to determine. Statistics displaying any figures will most definitely be under-reporting, as patients are either not testing for worms or are treated based on clinical symptoms. However, with increased consumption of pork and the factors listed above, it can be expected that the life cycle of *T. solium* will only continue to flourish.

Recommendations

On farms, it is important to acknowledge how inadequate feeds lead to farmers adopting a free-roaming system of pig keeping. While ASF is extremely visible, farmers are unsure of the source of the virus in the environment. Furthermore, no farmers interviewed linked cysticercosis with free-roaming pigs.

Consequently, an awareness campaign should be established to promote simple and affordable sty development and management. The link between free-roaming pigs and diseases should be emphasized. Focusing on a visible disease to farmers such as ASF may be more beneficial. While not directly addressing *T. solium* transmission, which is perceived as unproblematic and invisible on farms, biosecurity techniques implemented to control ASF would also simultaneously apply to the *T. solium* life cycle.

Vet shops are important sites of knowledge for farmers. Thus, training vet shop staff would improve the information given in relation to drug dosages and deworming treatments. Staff could also be trained to give advice concerning proper biosecurity measures for ASF while selling pig-related farming products.

Community-based animal health workers (typically without advanced formal education and/or not employed by the government) are frequently relied upon throughout Mukono. However, these 'local vets' often have minimal training and are called upon by farmers to solely administer drugs. Identifying and training these animal health workers, found in every village, would distribute knowledge further than relying upon the limited number of government-contracted vets. It would also save farmers from the travel expenses associated with centralized information sessions.

In pork joints, butchers and consumers have little knowledge of zoonotic diseases. Pork is perceived as a cure as opposed to a cause of disease and the preservation and cooking of pork is not adequate. Moreover, the tendency for consumers to drink alcohol while eating pork leaves individuals at an increased risk of being infected with zoonotic diseases.

Continued training of butchers, especially in the vernacular language, is important. However, based on trainings by ILRI, there is an assumption that outside researchers only come to give 'gifts' during training and then leave. This means there is an expectation that training implies receiving something tangible rather than knowledge alone. Therefore, training an established butcher in Mukono to distribute knowledge would have more fruitful results than a researcher coming in from outside. In addition to this, there should be increased training and information, specifically, real pictures to help butchers in identifying cysts in meat. Current posters, which are word-heavy or focus on the *T. solium* life cycle without displaying real-life pictures, are being regularly misinterpreted.

Given that high numbers of pork consumers may also be HIV-positive, there is potential to collaborate with partners working in HIV/AIDS research. Educating HIV-positive individuals on identifying hygienic pork joints and consuming thoroughly cooked pork would help in reducing the risk of immunocompromised individuals contracting a zoonotic disease.

Hygiene conditions are poor throughout slaughterhouses. Accordingly, there should be increased recognition and training of workers and construction of slaughter slabs for informal slaughterhouses in Kampala. Increased visibility of these sites would allow for diseases such as cysticercosis and ASF to be closely monitored. These sites should not be closed, as they will just keep appearing informally until they are legally recognized.

While bringing together pigs for slaughtering could increase the risk of cross-contamination with bacteria found in pig faeces, which can cause foodborne disease, centralized slaughter slabs in Mukono would allow for daily meat inspections to be carried out. This would concurrently allow for farms perpetuating the *T. solium* life cycle to be more rapidly identified. Subsequently, in Mukono, at least three centralized slaughter slabs should be strategically placed throughout the district. One in Mukono town would be insufficient as distance and travel costs would limit many traders and/or butchers.

Regarding diagnostics, ILRI plans to trial the diagnostic kit for cysticercosis at Wambizzi slaughterhouse. However, for more informed results, informal slaughterhouses throughout Kampala should also be identified and comparable samples taken across these locations. This is because it appears infected pigs are systematically targeted to informal slaughterhouses.

As many of the diseases associated with pig farming are zoonotic, it is vital to build stronger partnerships with the Ministry of Health in Uganda. At present, there is little to no observable collaboration between veterinarians and doctors. However, other studies have suggested that implementing treatment for both humans and animals at the same time has shown to reduce costs and improve coverage (Schelling 2007). Establishing such partnerships would contribute towards a greater realization of One Health and could strengthen interventions along the pig value chain.

Pig farming and pork butchery have great potential in Uganda's central region. This research has highlighted both the transmission and consequences of pig-related diseases but also the positive impact that pigs and pork have for all actors along the value chain. Thus, through addressing the factors highlighted it is hoped that the Ugandan pig value chain can only improve, thereby benefiting all actors involved.

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